

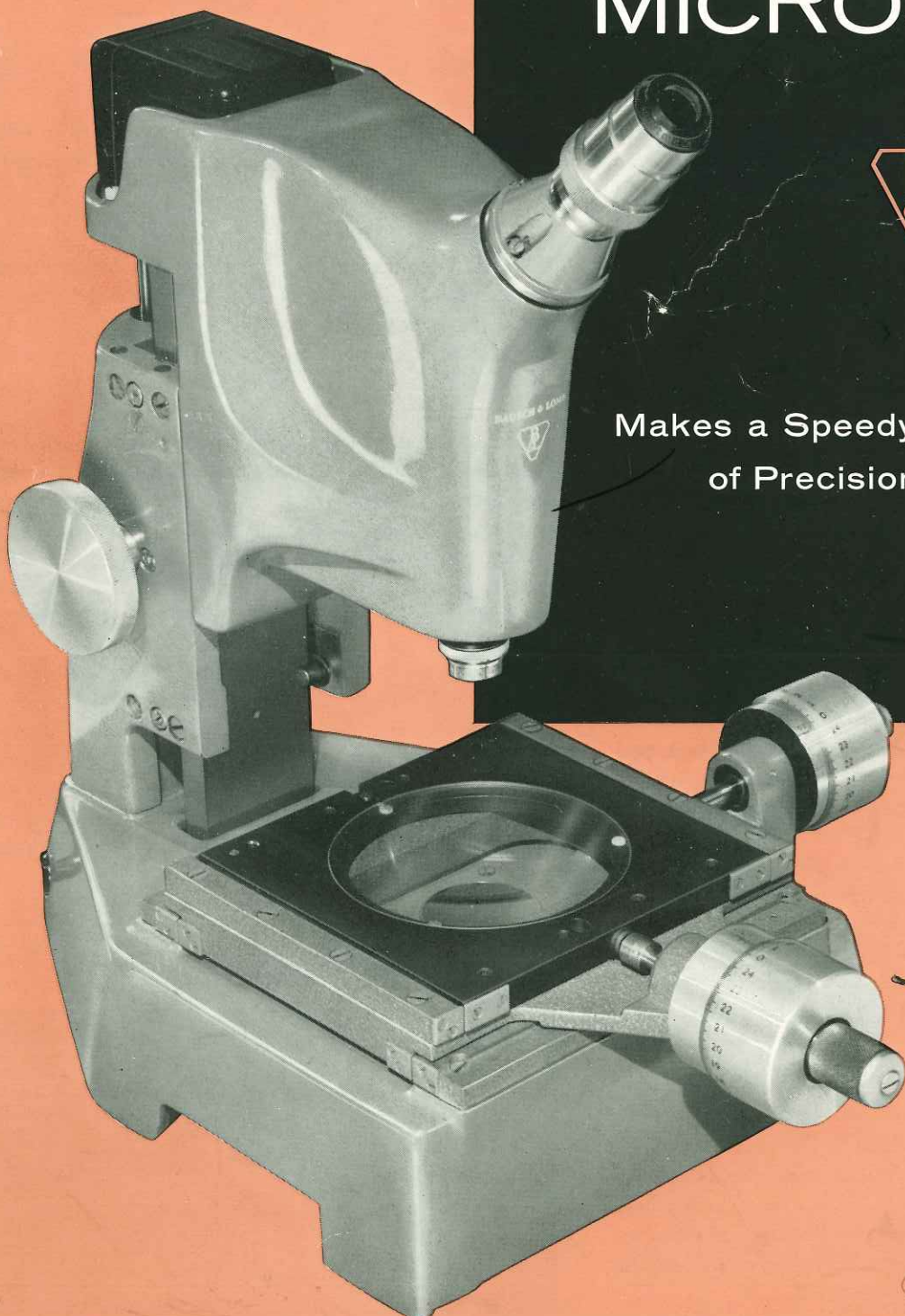
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NEW

BAUSCH & LOMB TOOLMAKERS' MEASURING MICROSCOPE



Makes a Speedy, Routine Operation
of Precision Measurement



DIVISION 7
JUN 18 1957
U.S. PATENT OFFICE

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Toolmakers' Microscopes are capable of an accuracy difficult to achieve with mechanical gaging devices. In addition, they simplify the measurement of complex setups that can otherwise be accomplished only by roundabout, time-consuming methods.

To provide the high order of accuracy required of it, a toolmakers' microscope must be manufactured with as much regard to the precision of optical elements as to mechanical parts. Unless the images seen through the microscope are crystal-clear and free from even the slightest dis-

tortion or fuzziness, mechanical precision becomes useless, resulting in the introduction of serious errors.

This combination of optical and mechanical precision so necessary to assured accuracy is provided in the Bausch & Lomb Toolmakers' Microscope. Cross lines, and details in the tool or part being measured, are extremely sharp so that the operator is always certain he is measuring from a true reference point. Images are erect and unreversed to further simplify measurement. Deviation from straight line action of microscope body slide and stage slides is so negligible that it cannot affect accuracy of measurement.

Features that assure Highest Accuracy and Efficiency

Inspection and measurement of drills, taps, jigs, templets, broaches, holes, milling tools, reamers and all kinds of small parts are made with ease and simplicity, encouraging frequent checks. This results in a considerable reduction in rejects in further stages of production.

Accuracy Unimpaired by Normal Vibrations

The Microscope body is hung from a massive upright, on a precisely lapped rack-and-pinion slide. A steel rod slides into the upright to provide even greater stability. Accuracy is not affected by vibrations from nearby machines, so that the instrument can be used almost anywhere in the shop. Light in weight (only 23 lbs.) it is easy to move from place to place.

Base of the instrument is heavily, scientifically ribbed to provide maximum rigidity.

Quick, Accurate Focusing

Focusing is achieved by rack and pinion. Action is extremely smooth, bind-free so that focusing on the finest reference points or lines is accomplished without effort. Rack and pinion are completely enclosed in the microscope head, protected against dust, dirt and foreign particles. Working distance is 4", permitting focus on parts or tools up to 2½ inches in depth.

The eyepiece is inclined at a convenient angle to assure comfortable use over extended periods. A knurled ring on the eyepiece permits sharp focusing on the cross lines.

Total Magnification is 35X. Different combinations of eyepieces and objectives are available to provide various other magnifications, as shown in the table on the back page.

Precise Alignment of Cross Line and Stage Movement

A special feature of this instrument is the ease with which cross lines are aligned with the lateral or longitudinal movement of the stage. Simple adjustment of a screw at the base of the eyepiece mount rotates the cross lines to a position exactly parallel with stage movement in either direction. The

precision of this adjustment eliminates the errors in measurement that are introduced by any deviation from parallelism.

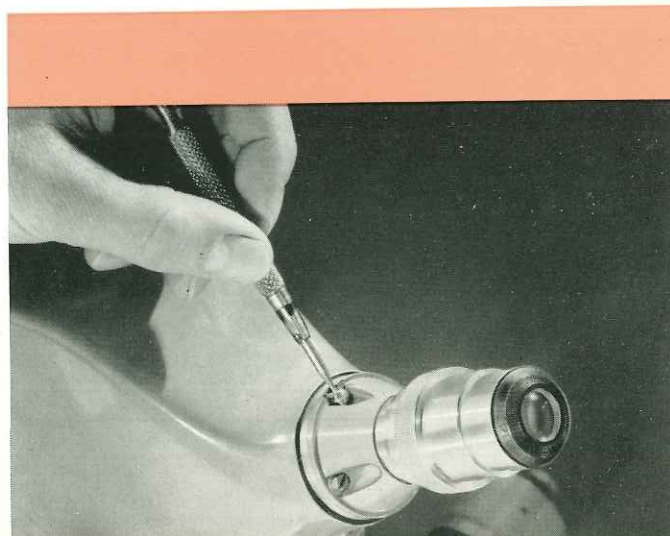
Cross Slide Stage

The B&L Toolmakers' Microscope permits measurements in two coordinates. Range is 1" in the longitudinal direction and movement is completely controlled by a micrometer screw. Range in the lateral direction is 1" with a second micrometer screw, and this is extended to 2" by use of a 1" gage block or its equivalent.

Micrometer drums are large, eliminating the need for verniers. Least reading is directly to .0001". Floating, hardened steel inserts in a cap on the end of the micrometer spindles take up wear so that the accuracy of gage blocks is not destroyed.

Stage slides move on spring-loaded ball bearings. Action is smooth, positive and bind-free. Stage anvils bear against floating inserts on the micrometer spindles with a spring tension of approximately 1½ lbs.

The glass stage plate permits viewing profiles of opaque objects which do not cover the entire field of view. This plate is parallel to the stage surface within 3 minutes of arc and flush with the surface within a tolerance of .005". The stage measures approximately 5.4" square. Flat objects are simply laid on it for measurement, round objects are held in standard Vee blocks or in the centers available as optional equipment.



True Vertical Illumination

The illuminating system is an integral part of the instrument, designed so that the light beam follows a path coaxial with that of the optical system. Vertical illumination makes it easy to pick up reference points in holes, crevices, channels etc. without the annoying and accuracy-destroying shadow effects produced by oblique lighting.

The lamp is quickly and easily accessible for replacement.

Eliminates "Down" Time

This instrument is ruggedly constructed to provide years of efficient trouble-free service. However, should the instrument be unavoidably damaged, it can be quickly put back into service without undue effort or cost. The optical system with the exception of eyepiece, objective and mirror, is completely self contained in one unit for quick replacement. This is also true of the illuminating system with the exclusion of the lamp housing.



Increased Versatility with Optional Accessories

Protractor Eyepiece

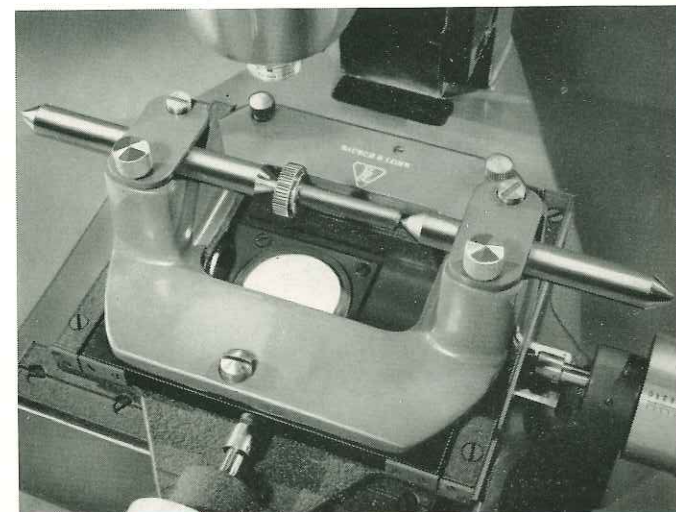
This eyepiece permits measurement of angles not possible with the standard eyepiece. Two interrupted cross lines are seen in the eyepiece, one of which can be rotated against the other by means of a knurled ring. Between the range of 40° - 70° , the included angle can be read directly to $20'$ by means of a graduated scale seen in the field of view. A scale located on the outside of the eyepiece is graduated from 90° - 0° - 90° . By means of a scale magnifier system, readings of the scale can be made to 1 minute of arc.

An adapter permits the protractor eyepiece to be quickly substituted for the standard eyepiece.



Center Support with Centers

The center support provides an accurately made set of Vee's for attachment to the microscope stage. An accurately ground pair of centers are supplied with the support. A fix pin and eccentric pin in the support engage holes in the stage to assure accurate placement. The eccentric can be rotated to adjust the center line of the center supports, or centers, to the right and left direction of stage motion. Maximum center distance is 4"; maximum swing $1\frac{1}{2}''$.



Special Eyepiece Scales

While no provision is made for the use of standard templets, special scales can be made to customer specifications. In production work these are usually more efficient than the standard templets since they can be tailored exactly to a specific application. Bausch & Lomb has excellent facilities for ruling these special scales for many different applications. We invite your inquiry.

MAGNIFICATIONS

Objectives	48mm	40mm	32mm	22.7mm	16mm
W.F. Eyepiece	Working Distance 1.875"	1.875"	1.437"	0.625"	0.250"
7.5×	Field 0.135"	0.106"	0.077"	0.048"	0.030"
	Mag. 27.6×	35×	48.7×	77.2×	123×
10×	Working Distance 1.812"	1.375"	1.437"	0.625"	0.250"
	Field 0.138"	0.108"	0.077"	0.048"	0.031"
	Mag. 42.4×	53.1×	72.8×	115.6×	181×
15×	Working Distance 1.812"	1.375"	1.437"	0.625"	0.250"
	Field 0.138"	0.108"	0.078"	0.048"	0.031"
	Mag. 63.6×	79.6×	109.2×	173.4×	271×
20×	Working Distance 1.812"	1.375"	1.437"	0.625"	0.250"
	Field 0.110"	0.088"	0.064"	0.040"	0.025"
	Mag. 84.8×	86.2×	145.6×	231.2×	360×

TECHNICAL DATA

General	Size—13 3/4" x 16 1/2" x 18" Weight—23 lbs. Finish—Smooth Grey
Stage	Total Range—1" x 2" Micrometer fore and aft Motion—1" Micrometer right and left Motion—1" Additional right and left Motion with gage block—1" Least Reading on Micrometer—0.0001" Work Table Size—Approx. 5.4" square
Microscope	Magnification—35×
	Objective—40mm Focal Length
	Ocular—7.5× Wide Field
	Diameter of real field—0.106"
	Clear Working Distance—1.3"
	Illumination—Bright Field and Surface Illumination
	Focusing Range—4" Continuous

SPECIFICATIONS

Cat. No. 33-14-06	Toolmakers' Measuring Microscope complete with 40mm objective; 7.5× Wide Field Eyepiece; glass stage plate, and mirror Price—\$1,200.00
33-15-16	Center Support, complete with centers Price—\$120.00
33-14-35	Protractor Eyepiece, with adapter Price—\$300.00

Prices are subject to change without notice. Orders are subject to acceptance at Rochester, N. Y., U.S.A., at prices prevailing at time of shipment. Orders for standard items may be cancelled if not wanted because of price advance. Excise taxes or other governmental charges will be added wherever applicable. Shipments to points outside Continental United States of America and to its territories, dependencies and possessions, except Hawaii and Alaska are not subject to excise taxes. Delivery dates are estimated and cannot be guaranteed.

BAUSCH & LOMB OPTICAL CO.

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